

## MEASURING EQUIPMENT MANAGEMENT EFFICIENCY

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### ABSTRACT

AFTER THE EQUIPMENT Management CENTER HAS BEEN ESTABLISHED AND IS OPERATING, MAXIMIZED UTILIZATION OF ASSETS MUST BE MEASURED. HOW THIS IS DONE IS UP TO THE DISCRETION OF THE CENTER MANAGER. THE REPORTS MUST SHOW HOW THE DEPARTMENT IS CONTROLLING COST. CORRECT FORMULAS MUST BE USED TO MONITOR THE CENTER EFFICIENCY. THE OUTPUT SHOULD SHOW THE PROPER BALANCE OF RENT/LEASE VERSUS BUY, AND THE PRACTICAL REDEPLOYMENT AND SALVAGING OF EQUIPMENT ON HAND. THIS PAPER WILL SHOW DIFFERENT WAYS OF MEASURING THE EFFICIENCY AND HOW BEST TO ACHIEVE THE REQUIRED RESULTS.

### INTRODUCTION

WHEN STARTING THIS ENDEAVOR, THE IDEA WAS TO FIND SOME WAYS OF ENSURING THAT THE MAXIMUM UTILIZATION OF TEST EQUIPMENT WAS BEING OBTAINED BY AN ORGANIZATION. A SURVEY (figure 1) WAS SENT TO 98 INDIVIDUALS FROM A DIVERSE SPECTRUM OF COMPANIES, AEROSPACE, TEST EQUIPMENT MANUFACTURERS, UTILITY COMPANIES, AND AIRLINES, JUST TO NAME A FEW. TABLE 1 SHOWS THE RESULTS OF THE SURVEY. SURPRISINGLY ONLY 16 COMPANIES HAD ANY KIND OF POOL AREA AND A MAJORITY HAD NO WAY OF KNOWING IF THEY WERE EFFICIENT OR NOT. OTHERS HAD JUST A HOLDING AREA FOR OLD EQUIPMENT THAT HAD LITTLE OR NO USE TO THE COMPANY. THESE AREAS I KINDLY PHRASED AS "RELIC RACKS".

AS YOU READ ALONG I HOPE TO GIVE INSIGHT ON WHAT IS REQUIRED TO MEASURE EFFICIENCY AND SOME WAYS OF INCREASING THE EFFECTIVENESS OF AN EQUIPMENT MANAGEMENT FUNCTION (EMF).

### WHY DO WE NEED TO MEASURE?

THE FIRST THING THAT MUST BE UNDERSTOOD IS THAT 100% EFFICIENCY FOR AN EMF WOULD MEAN NO EQUIPMENT WAITING TO BE CHECKED OUT AND ALL THE CUSTOMERS HAVING WHAT THEY NEED AND NOT HAVING TO WAIT FOR WHAT THEY REQUEST. THIS IS THE IMPOSSIBLE DREAM. A CERTAIN AMOUNT OF EQUIPMENT MUST BE KEPT ON HAND FOR EMERGENCIES AND GENERAL CHECK-

OUT . HOW MUCH EQUIPMENT IS ON HAND WITH USAGE MONITORED, HOW LONG A CUSTOMER WAITS FOR EQUIPMENT, HOW WELL THE CHARGE BACK RATE IS CONTROLLED, AND THE NUMBER OF PERSONNEL INVOLVED IN THE EMF ARE THE SUREST AND EASIEST WAY OF MEASURING HOW EFFICIENT THE FUNCTION IS OPERATING. THE FOLLOWING IS A SYNOPSIS OF THE RESULTS OF THE SURVEY WHICH WILL HELP IN BETTER UNDERSTANDING THE NEED TO MEASURE EFFICIENCY.

#### SURVEY RESULTS

AS STATED EARLIER THE SURVEY WAS SENT TO 98 INDIVIDUALS FROM DIFFERENT DISCIPLINES IN THE METROLOGY/EQUIPMENT MANAGEMENT WORLD. OF THE 98 SENT 53 (54%) WERE RETURNED. OF THESE 32 DID NOT HAVE AN EQUIPMENT MANAGEMENT CENTER, 4 DID NOT HAVE ONE BUT ARE PLANNING TO START ONE, AND 16 HAD CENTERS OPERATING. IN THE FOLLOWING SECTIONS A BREAKDOWN OF THE QUESTIONNAIRE BY NUMBER WILL BE PRESENTED.

WITH THE INCREASING NUMBER OF COMPANIES RIGHTSIZING. THE NEED BY ORGANIZATIONS TO REDUCE OVERALL COSTS IS PARAMOUNT. THE RESULTS FOR WHY THE EMF WAS CREATED WERE UNANIMOUS! IT WAS SEEN AS THE BEST WAY TO CONTROL COST AND STILL GIVE HIGH LEVELS OF SERVICE TO EQUIPMENT USERS.

PERSONNEL REQUIREMENTS WAS ALMOST CONSONANT WITH THE REASON FOR STARTING THE EMF. THIS IS WHERE MAXIMUM EFFICIENCY STARTS. WITH PROPERLY TRAINED PEOPLE CUSTOMERS WILL BE MORE LIKELY TO RETURN FOR 130TH EQUIPMENT AND INFORMATION ON WHAT AND HOW TO USE THE EQUIPMENT. ELEVEN OF THE SIXTEEN RESPONDENTS WROTE THAT EXPERIENCE AND TRAINING WERE REQUIRED FOR THOSE WORKING IN THE EMF. TWO OTHERS HAD UNION REQUIREMENTS AND ONE JUST HAD LIFTING REQUIREMENTS .

THE MEASURING CRITERIA USED IN THE EMF TOOK A WIDE SPECTRUM OF APPROACHES. NUMBER IN INVENTORY VERSUS NUMBER DEPLOYED WAS THE NUMBER ONE RESPONSE WITH SEVEN OF THE SIXTEEN USING THIS AS A PORTION OF THEIR MEASURING TECHNIQUE, SERVICE LEVELS WAS THE SECOND MOST RECEIVED WITH SIX EMF'S USING THIS AS A PORTION OF THE MEASUREMENT . IT IS ALSO NOTEWORTHY TO MENTION THAT FOR AIRLINES HAVING AN EMF, SERVICE LEVELS IS THEIR TOP PRIORITY. OTHER REPLIES USED IN THE MEASURING EQUATION WERE, THE SURPLUS OF EQUIPMENT, COST OF PURCHASES, BUYING NEW VS. USED EQUIPMENT, AND THE AMOUNT OF DELINQUENT EQUIPMENT IN USE. FOUR OF THE RESPONDENTS HAD NO MEASURING TECHNIQUES IN PLACE. NO ONE HAD OR WOULD SHARE A FORMULA IN THE WAY OF MEASURING. ALTHOUGH TWELVE OF THE SIXTEEN USED A

COMBINATION OF THE ABOVE TO CHECK THE EFFECTIVENESS IN HELPING TO CONTROL COST IN THEIR COMPANIES.

THE COSTS OF OPERATING THE EMF WILL VARY DEPENDING ON WHAT FUNCTIONS ARE SUPPLIED. IF ALL CAPITAL AND ALL EQUIPMENT IS CONTROLLED BY THE EMF THEN ZERO DOLLARS INCOME TO OUTGO WILL BE HARD TO PREDICT. AN ORGANIZATION MUST KNOW WHAT EXPENSES WILL BE REQUIRED (PERSONNEL, RENTAL, LEASES, AND CAPITAL,) YEARLY TO BUDGET FOR OPERATING COSTS OF THE EMF. IF CAREFUL CONSIDERATION IS GIVEN ALL POSSIBLE OPERATING COST INCOME AND OUTGO SHOULD EQUAL ZERO WITH A PLUS OR MINUS THREE PERCENT ERROR FACTOR. THE ANSWERS RECEIVED BACK SHOW NINE OF THE SIXTEEN IN THE ZERO OR PLUS/MINUS THREE PERCENT BRACKET. THE REMAINING EITHER HAD NO REQUIREMENTS OR ALL THEIR COSTS WERE CONSIDERED OVERHEAD.

THE RATE FACTOR FOR CHARGEBACK IS THE BACKBONE FOR ENSURING THE INCOME AND OUTGO DOLLARS ARE ZERO AT THE END OF EACH YEAR. IF THE MONTHLY RENTAL COST PER ITEM IS TOO LOW THE EMF WILL SHOW A NEGATIVE AND IF TOO HIGH THE OPPOSITE WILL HAPPEN. HOW THIS IS CALCULATED FOR THE MONTHLY RENTAL CHARGES WILL ALSO DETERMINE WHAT TYPES OF EQUIPMENT WILL BE USED. THE REMARKS ACQUIRED FROM THE QUESTIONNAIRE SHOW EIGHT DO NOTHING TO CHANGE THE COST PER TYPE OF EQUIPMENT EVEN IF THE PURCHASE PRICE CHANGES. FIVE UPDATE THEIR DATABASE ON A YEARLY BASIS AND ONE EACH CHANGE TWO, FOUR AND TWELVE TIMES PER YEAR.

WHAT TYPES OF EQUIPMENT ARE MANAGED BY THE EMF HAVE A DEFINITE IMPACT ON EFFICIENCY. EQUIPMENT THAT IS PROJECT/PROGRAM SPECIFIC, IF HANDLED BY THE EMF WILL BE IN STORAGE WHILE WAITING FOR USE AND THEN BE STORED AGAIN UNTIL THE PROGRAM HAS NO USE FOR THEM. THIS WILL PUT AN UNDO BURDEN ON SPACE AND PERSONNEL WITH NO APPARENT RETURN ON ASSETS. ELEVEN OF THE SIXTEEN RESPONDENTS SAID USAGE AND OR REDEPLOYMENT CAPABILITIES ARE REQUIRED FOR EQUIPMENT TO BE CONSIDERED FOR THE EMF. THREE NEED THE EQUIPMENT TO BE COMMERCIALY AVAILABLE AND HAVE A COST CONSTRAINT. WHETHER THE EQUIPMENT IS CALIBRATEABLE, RELIABLE, AND IF THE EQUIPMENT IS GOVERNMENT' FURNISHED EQUIPMENT OR NOT WERE OTHER AREAS OF CONCERN.

AS THE NEED FOR CERTAIN TYPES OF EQUIPMENT DWINDLES THE EMF MUST BE AWARE. SOME EQUIPMENT WILL JUST SIT ON A SHELF FOR MONTHS AND NOT BE UTILIZED. OTHERS WILL COST MORE TO MAINTAIN THAN THE RENTAL RATES WILL BEAR. A GOOD DATABASE WITH INFORMATION PERTAINING TO USAGE, NUMBER IN INVENTORY AND MAINTENANCE COST WILL BE BENEFICIAL TO THE EQUIPMENT Management FUNCTION. THIRTEEN OF SIXTEEN RESPONSES HAD USAGE AS THE NUMBER ONE FACTOR ON WHEN IT IS TIME TO

SURPLUS EQUIPMENT. THE SECOND HIGHEST RESPONSE IS COST TO MAINTAIN OR CONDITION OF THE EQUIPMENT WITH ELEVEN PEOPLE USING THIS AS PART OF ALGORITHM TO SURPLUS EQUIPMENT. OTHER RESPONSES ARE AMOUNT OF BUSINESS WITH FOUR PEOPLE USING THIS AND TWO USING NUMBER IN INVENTORY.

AFTER IT HAS BEEN DETERMINED TO SURPLUS AN ITEM THE EMF MUST DECIDE HOW BEST TO DISPOSE OF IT. CAREFUL CONSIDERATION MUST BE TAKEN TO ENSURE THE COMPANY IS GETTING THE BEST RETURN FOR THE EQUIPMENT. EVEN THOUGH SURPLUS SALES MAY SOUND LIKE THE BEST ROUTE FOR THE DISPOSING OF EQUIPMENT TRADE-INS AND DONATIONS TO EDUCATIONAL INSTITUTIONS MAY HAVE A MORE SIGNIFICANT IMPACT IN THE WAY OF PURCHASE PRICE OF NEW EQUIPMENT OR DOLLAR AMOUNT WRITTEN OFF THROUGH DONATIONS. FOURTEEN OF THE SIXTEEN PEOPLE RESPONDING USED SURPLUS SALES TO DISPOSE OF EQUIPMENT NO LONGER NEEDED. SEVEN ALSO USED DONATIONS AND OR SCRAPPING OF EQUIPMENT DEPENDING ON CONDITION. ONLY THREE USED THE OLDER EQUIPMENT AS TRADE-INS.

THE COMBINATION OF GROUPS THAT COMPRISE THE EMF WILL HAVE A MAJOR IMPACT ON THE OVERALL EFFICIENCY. METROLOGY, PROPERTY AND THE PROCUREMENT SECTION WITHIN THE COMPANY MUST HAVE AN EXCELLENT WORKING RAPPORT WITH THE EMF. IN MOST ORGANIZATIONS ALL EQUIPMENT BELONGING TO THE EMF MUST, AT ONE TIME OR ANOTHER, BE CALIBRATED OR REPAIRED DURING ITS LIFE CYCLE. THE EQUIPMENT MUST BE IDENTIFIED AS TO STATUS IN THE COMPANY i.e. CAPITAL, LEASED, RENTAL, OR LOW COST ITEMS. FINALLY THE EXPEDIENCY AT WHICH AN ITEM CAN BE PROCURED WILL EFFECT THE SERVICE LEVELS. THERE WERE EIGHT SEPARATE CATEGORIES ANSWERED IN THIS RESPONSE. THEY WENT FROM THE EMF BEING IT'S OWN ORGANIZATION TO ALL ORGANIZATIONS IN A COMPANY BELONGING TO THE EMF. THE TOP THREE ORGANIZATIONS THAT WERE PART OF THE EMF WERE , EQUIPMENT MANAGEMENT, METROLOGY/CALIBRATION, AND PROPERTY. WITH RESPONSES OF TEN, ELEVEN, AND FIVE RESPECTIVELY.

## **SUMMARY**

IN ORDER TO OPTIMIZE THE EFFICIENCY OF AN EQUIPMENT MANAGEMENT FUNCTION, CERTAIN AREAS OF THE COMPANY MUST WORK AS A TEAM. PERSONNEL MUST BE QUALIFIED IN THE USAGE OF EQUIPMENT MAINTAINED BY THE EMF. SELECTIVITY OF PROCURED EQUIPMENT IS NECESSARY SO THAT THESE ITEMS WILL BE USED ON A REGULAR BASIS IN ALL AREAS OF THE COMPANY. IN-DEPTH STUDIES NEED TO BE DONE IN ORDER TO ENSURE A PREMIUM RETURN IS OBTAINED ON THE DISPOSAL OF EQUIPMENT. SECTIONS WITHIN THE COMPANY, INVOLVED IN THE EQUIPMENT MANAGEMENT FUNCTION, MUST WORK FOR THE COMMON GOAL OF MAXIMUM EFFICIENCY. THE DATABASE

USED MUST ENCOMPASS ALL ASPECTS OF THE EQUIPMENT MANAGEMENT FUNCTION . IT MUST GENERATE REPORTS TO SHOW USAGE IN PERCENT, TOTAL NUMBERS BY MANUFACTURE AND MODEL NUMBER, AND ASSIST IN THE PROCUREMENT AND DISPOSAL PROCESS. USING THESE FIVE FACTORS AT THE HIGHEST DEGREE POSSIBLE WILL ASSURE YOUR EQUIPMENT MANAGEMENT FUNCTION IS GETTING THE GREATEST POSSIBLE EFFICIENCY.

## MEASURING EQUIPMENT MANAGEMENT EFFICIENCY

1a. DOES YOUR COMPANY PRESENTLY HAVE AN EQUIPMENT MANAGEMENT FUNCTION/LOAN POOL?  
YES \_\_\_ NO \_

1b. IF YOU ANSWERED 1a NO DO YOU HAVE ANY PLANS TO INSTITUTE SUCH AN ORGANIZATION?  
YES \_ NO \_

IF THE ANSWERS TO BOTH 1a AND 1b ARE NO PLEASE RETURN IN THE SASE PROVIDED AND  
THANK YOU FOR YOUR TIME.

IF 1b IS YES PLEASE ANSWER ANY QUESTION THAT YOU CAN AND RETURN.

2. WAS THE EQUIPMENT MANAGEMENT FUNCTION/LOAN POOL CREATED TO ASSIST IN REDUCING  
OVERALL COST?

YES \_\_\_ NO \_

3. ON WHAT BASIS ARE PERSONNEL SELECTED TO OPERATE THE EQUIPMENT MANAGEMENT  
FUNCTION/LOAN POOL.

4a. HOW IS THE EFFICIENCY OF THE EQUIPMENT MANAGEMENT FUNCTION MEASURED?

i.e. Requisition fulfillment, Surplus Equipment, Inventory Turnover, etc.

4b. IS THERE A FORMULA USED? IF SO CAN YOU SHARE IT?

YES \_\_\_ NO \_

5. IS IT NECESSARY FOR EQUIPMENT MANAGEMENT DEPARTMENT COST TO HAVE ZERO DOLLARS  
AT YEAR END? IF NO SOME REASONS WHY NOT.

YES \_ NO \_

6. HOW OFTEN ARE THE RATE FACTORS (CHARGEBACK) PERCENTAGE AND/OR THE ITEM COSTS  
CHANGED IN THE EQUIPMENT MANAGEMENT SYSTEM.

7. WHAT EVALUATION IS MADE BEFORE MEASURING AND TEST EQUIPMENT BECOME POOL ITEMS?

i.e. Cost, Usage, etc.

8. WHAT CRITERIA IS USED WHEN SURPLUSING EQUIPMENT THAT IS PART OF THE EQUIPMENT  
MANAGEMENT FUNCTION.

9. IN WHAT WAYS ARE THE ITEMS IN THE EQUIPMENT MANAGEMENT FUNCTION DISPOSED OF?

10. WHAT ORGANIZATIONS IN YOUR COMPANY ARE CONSIDERED PART OF THE EQUIPMENT  
MANAGEMENT FUNCTION?

## EFFICIENCY QUESTIONNAIRE

Figure 1

## QUESTIONNAIRE RESULTS

1. DOES COMPANY HAVE EQUIPMENT MANAGEMENT P'UNCTION.  
98 SENT  
53 RETURNED  
17 YES  
4 NOT AT PRESENT RUT PLANNED FOR FUTURE
2. CREATED TO ASSIST IN COST REDUCTION.  
15 YES  
2 NO
3. PERSONNEL SELECTION.  
11 EXPERIENCE/TRAINING  
2 UNION CONSTRAINTS  
1 LIFTING REQUIREMENTS
4. EFFICIENCY MEASUREMENTS.  
7 INVENTORY VS. DEPLOYED  
6 ON TIME DELIVERY (SERVICE LEVELS)  
5 COST OF EQUIPMENT  
4 COST TO SURPLUS  
4 COMPANY HAD NO MEASUREMENT CAPABILITY  
1 NUMBER OF DELINQUENT ITEMS
5. DEPARTMENT INCOME EQUAL OUTGO AT YEAR END.  
6 YES  
3 NO  
5 UP TO +/- 10%
6. CHANGE CHARGBACK RATE FACTORS(  
9 NEVER  
5 YEARLY  
1 BI-ANNUAL  
1 QUARTERLY  
1 MONTHLY

QUESTIONNAIRE RESULTS  
TABLE 1

- 7. **EQUIPMENT EVALUATION FOR EMF.**
  - 6 USAGE
  - 5 REDEPLOYMENT CAPABILITIES
  - 3 COMMERCIAL AVAILABILITY
  - 3 CALIBRATEABLE
  - 3 COST OF THE ITEM
  
- 8. **SURPLUS CRITERIA.**
  - 13 USAGE
  - 11 COST TO MAINTAIN
  - 4 BUSINESS CONDITIONS
  - 2 AMOUNT IN INVENTORY
  
- 9. **DISPOSAL METHODS.**
  - 14 SURPLUS SALES
  - 7 DONATIONS
  - 7 SCRAP
  - 3 TRADE-INS
  
- 10. **EQUIPMENT MANAGEMENT FUNCTION ORGANIZATIONS.**
  - 10 EQUIPMENT MANAGEMENT CENTER (LOAN POOL)
  - 11 CALIBRATION
  - 5 PROPERTY
  - 3 QUALITY ASSURANCE
  - 2 PROCUREMENT
  - 1 FACILITIES
  - 1 ALL MANUFACTURING ORGANIZATIONS

QUESTIONNAIRE RESULTS  
TABLE 1 (cent.'d)